Imaging Polarimetry of Mars

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Polarimetry is one of very strong methods to reveal properties of planetary aerosols. Polarization dependences on phase angle and wavelength enable us to distinguish aerosols (i.e., water-ice clouds and dust clouds) and the surface. Further, such dependences also enable us to know size distributions and refractive indexes. That can be done to some extent even only by the sign of polarization.

However, Mars polarimetry observations were very few in the records [Ebisawa and Dollfus (1993)]; imaging-polarimetry observations were fewer, and multi-color polarimetry were much fewer. The lack of Mars polarimetry might be caused by the low signals (order of 1%) and the difficulty to control the observation conditions (in case of Earth-based observations).

We are planning a new camera onboard the upcoming Mars orbiter. The new camera can measure spatially-resolved linear and circular polarizations. Circular polarization will tell us existence (or nonexistence) of homochirality, which directly connects with biological potential of Mars.

Keywords: Mars, Polarimetry